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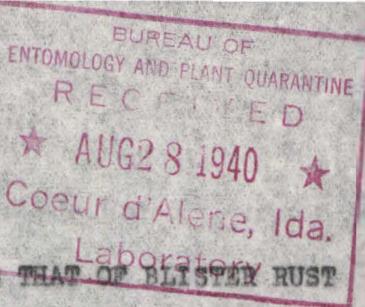
**TITLE**

INJURY CAUSED BY SUGAR PINE MATSUCOCCUS SCALE  
RESEMBLES THAT OF BLISTER RUST

by

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Within recent years scale insects on pines have commanded greater attention than heretofore as possible major forest pests. The scales about which we have greatest concern includes forms belonging to the genus Matsucoccus, family Margarodidae. The damage inflicted by these insects to pine trees varies according to the species of scale concerned. In general, however, the damage is definitely one of injury to the twigs and branches, weakening of the crowns of both young and mature pines, and deformation of the younger trees.

In 1936 Mr. G. R. Struble of the Forest Insect Laboratory at Berkeley, California called attention to damage produced by one of these margarodid scale insects attacking sugar pine, Pinus lambertiana, reproduction on the Sierra National Forest. The scale, identified by Professor G. F. Ferris of Stanford University as a new species of Matsucoccus, was later (January 1939) named by Dr. Harold Morrison<sup>1/</sup> of the Bureau of Entomology and Plant Quarantine, Division of Insect Identification, as Matsucoccus paucicicatrices. In addition to sugar pine, the insect is known to occur on Pinus monticola and P. flexilis. Up to the present date it has been collected from various localities in California, Oregon, Montana and Wyoming.

<sup>1/</sup> Morrison, H. 1939. Descriptions of new species of Matsucoccus (Hemiptera: Coccidae). Ent. Soc. Wash., Proc., 41:1-20.

Because of the widespread distribution of this insect, and its apparent damage to second growth sugar pine as well as its known presence in a few mature pines, it seems advisable at this time to report upon the preliminary studies initiated on this scale insect by the Bureau of Entomology and Plant Quarantine, Division of Forest Insects. It is of further significance because of the injury it produces suggests that caused by the white pine blister rust.

#### CHARACTER OF DAMAGE

The needles of a sugar pine branch, that is going to die as a result of scale feeding, will commence fading usually during the spring of the year. The needles are pale green at first, but as the season progresses they turn straw-colored and finally a deep sorrel. As a general rule, dead needles will remain intact with the stem during the summer and fall seasons and oftentimes will be retained into the following year. Faded branchlets and twigs form conspicuous "flags". There appears to be more of a tendency for small branchlets to flag than there is for the large branches. When all of the branchlets are killed, however, the large branch itself will soon perish. In certain areas infestations of this scale insect are common on the trunks of young trees, particularly in the upper crowns.

Stems that are heavily infected with *Matsucoccus paucicicatrices* will show considerable resining and cracking of the bark. The scales seem to prefer to settle about nodes on the branches. Around such infested nodes there is a decided swelling of the tissue, and also a copious flow of resin. This resin flow tends to "pitch-out" the scale insects and also form a resined lesion at the node. This lesion kills the branch.

### FREQUENCY OF BRANCH FLAGGING

Preliminary evidence indicates that branch flagging tends to be most severe during the early part of the season. Some flagging may, however, continue more or less throughout the whole year. The results of periodic flag readings on six naturally infested sugar pines of pole size is presented in Table 1.

Table 1

Sequence of branch flagging on six naturally infested sugar pines of pole size. Sierra National Forest, California

Date of reading	Number of flags observed	% of total for season
April 14, 1939	157	70.6
June 30, 1939	33	14.9
July 27, 1939	19	8.6
August 28, 1939	13	5.9
Total for season	222	100.0

Early flagging is to be expected since the scale insects have reached maturity by spring and the full complement of damage as caused by the feeding larvae is attained. Injury caused by the scale insects takes place principally during the dormant season, but branch dying is not noticeable until spring when losses through transpiration become greater.

#### ECONOMIC IMPORTANCE

On the basis of observations made in the field, Matsucoccus paucicicatrices apparently has a definite weakening effect on younger trees from sapling to pole size. Some trees have been killed outright as a result of the scale feeding, but the more common type of injury observed is the deformation of young trees due to the killing of terminal leaders and lateral branches. Infestations of this scale appear to be favored by conditions of highly competitive growth, although injury caused by this insect has been observed on sugar pine reproduction rather amply spaced. A canopy-like situation produced by larger trees overhead seems to be extremely desirable for developing scale insects. Flagging injury appears to be more prevalent under these growing conditions. Sugar pine growing in rather poor sites have also been found to be highly susceptible to scale insect attack and branch flagging.

The crowns of mature pines are also attacked by this scale insect and flagging has been noted on these big trees. Preliminary observations indicate, however, that the large trees are less affected by this scale than is the second growth type, unless the scale feeding on the mature pine branches is connected with a gradual decadence which renders the trees more susceptible to bark beetle attack. This phase of gradual decadence as caused by the activities of this scale will be more fully investigated in the future.

The importance of the scale in connection with white pine blister rust eradication work has been emphasized by Dr. Willis W. Wagener of the Office of Forest Pathology who has added the following comments to the above notes:

"The injury produced by Matsucoccus paucicicatrices is of significance because of its close resemblance to that caused by white pine blister rust, adding to the difficulties of early detection of incipient or advance infection centers for the latter disease on sugar pine. Early stages of Matsucoccus injury are sometimes so similar to incipient blister rust cankers that a microscopic examination of the bark tissues is necessary before a positive diagnosis can be rendered. Even in the later stages confusion is easy, particularly when the rust cankers are in a non-sporulating state. Until the rust becomes thoroughly established throughout the range of commercial sugar pine it will continue to be important for officials concerned with the control of the disease to determine as far as possible the limits of its advance in any given year and the injury caused by the Matsucoccus scale will add to the difficulties of the scouting on which this determination must be made."